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ABSTRACT

An attempt was made to measure the language behavior of students in the upper elementary grades. The procedures and results of research in the following five areas are described in this report: (1) Relationship between the Linguistic Ability Test and the written discourse of fourth and sixth graders; (2) Comparisons of the discourse of fourth and sixth graders and of males and females; (3) Analysis of the effects of color and abstractness of pictures and of the specificity of instructions used in obtaining written discourse samples; (4) Comparisons of written discourse rated good, average, and poor; and (5) Comparison of oral and written discourse (AG)

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TECHNICAL REPORT NO. 166

LINGUISTIC STRUCTURES IN THE DISCOURSE OF FOURTH AND SIXTH GRADERS

REPORT FROM PROJECT ON READING AND RELATED LANGUAGE ARTS: ORAL AND WRITTEN LANGUAGE LEARNING

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WISCONSIN RESEARCH AND DEVELOPMENT
CENTER FOR COGNITIVE LEARNING

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Technical Report No. 166

LINGUISTIC STRUCTURES IN THE DISCOURSE OF FOURTH AND SIXTH GRADERS

Lester S. Golub and Wayne C. Fredrick

Report from Project on
Reading and Related Language Arts

Oral and Written Language Learning

Lester S. Golub, Principal Investigator

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

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The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Oral and Written Language Learning Element on Reading and Related Language Arts. The general objective of the Oral and Written Language Learning element is to develop needs and specifications for instructional written materials and procedures in oral and written language in the elementary school. Prototypic instructional materials in oral and written language learning are developed from the specifications for this program. Involved in the program are teachers, English language arts coordinators, linguists, psychologists, and scholars in English language and language learning. Research is conducted to refine the program and to generate new knowledge which will be incorporated into this instructional system.

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ABSTRACT

Discourse samples from 160 Ss were measured using 63 variables that considered both quantity and complexity of output. These measures of the linguistic structures were compared to the rated quality of the discourse and to the scores of the Ss on a Linguistic Ability Test. The test scores were marginally related to the kinds of structures appearing in the discourse, but the relationship between the test and quality of writing was very high. Analysis of variance of the 63 measures showed numerous significant differences among the high, average, and low quality themes. Many of these differences reflected the greater length of the high themes and the limited output of the themes rated low, but differences in complexity of structures were also indicated. Differences between Fourth and Sixth Graders were found in T-unit length, clauses per T-unit, modals, nouns per T-unit, possessives, adverb position, and adverb type. Males and females differed mainly in the quantity of output.

An experiment testing color and abstractness of picture stimuli showed that black-and-white pictures and concrete pictures were slightly better as stimuli than pictures in color and of abstract nature. However, the particular picture seemed to outweigh the factors of color and abstractness.

Oral and written discourse were contrasted on 36 of the variables. Written samples showed more sentence patterns, adjective clauses, and prepositional phrases, and longer T-units than the oral samples. But oral samples were marked by a higher frequency of adverbs and more form-class words per function word.

I
INTRODUCTION

PURPOSE

The purpose of the present technical report is to describe the research activities of the project in Written and Oral Discourse. The ultimate goal of the project is to develop a curriculum to teach discourse. A strategy to achieve this goal was prepared (Golub, 1969a) and the need for research-based knowledge soon became evident as the strategy was implemented. Thus, an attempt was made to measure the language behavior of students in the upper elementary grades. This research produced results of importance in several areas. Among these and already reported were the successful efforts to develop a reliable Linguistic Ability Test (Golub, Fredrick, & Johnson, 1970; Fredrick, Golub, & Johnson, 1970). Other results included the analysis of the effects of different stimuli on written discourse (Golub & Fredrick, 1970a) and the description of syntactic and lexical deviations in written discourse (Golub & Fredrick, 1970b).

The present report describes the procedures and results of research in these five areas:

1. Relationship between the Linguistic Ability Test and the written discourse of Fourth and Sixth Grade students.

2. Comparisons of the discourse of Fourth and Sixth Graders and of males and females.

3. Analysis of the effects of color and abstractness of pictures and of the specificity of instructions used in obtaining written discourse samples.

4. Comparisons of written discourse rated good, average, and poor.

5. Comparison of oral and written discourse.

The basic data for these various comparisons were the tabulations of 63 variables from the written discourse. Several of these were measures of the quantity of discourse produced in response to a picture. For example, the numbers of words, sentences, clauses, nouns, adjectives, verbs, adverbs, determiners, qualifiers, possessives, suffixes, and other structures were counted. Measures of the complexity of writing, such as T-unit length, form-class words per function words, T-unit patterns, subordinate clause ratio, modals, and adverb position were also tabulated. The quantity and complexity of discourse as measured by these variables was compared to both the scores on the Linguistic Ability Test and to the teacher ratings of the overall quality of the discourse. These 63 variables were also used to compare the performance of groups differing in ability, grade, and sex. A subset of 36 variables was used to compare oral and written samples.

RELATED RESEARCH

The Linguistic Ability Test was developed because no other test seemed to measure the ability to think about language and to manipulate elements of the system of language. The development of the test is reported in two previous papers. (Golub, Fredrick, & Johnson, 1970; Fredrick, Golub, & Johnson, 1970).

The methodology for measuring the structures and syntax in oral and written discourse grew out of previous research. Golub (1967) used a set of 35 linguistic items in an attempt to determine the distinctive differences between oral and written discourse. These linguistic items included counts of relative clauses, modals, infinitives, prepositional phrases, adverbs, and connectors. Also recorded were such features as tense, sentence pattern, transformed sentences, ambiguities, kernel ideas, and content-specific vocabulary.

A similar set of linguistic features was used by Blount and others in experiments that were designed to study the effects of instruction in grammar (Blount, Fredrick, & Johnson, 1968). Several of these linguistic structures were found to distinguish the written discourse of Eighth and Twelfth Grade students (Blount, Johnson, & Fredrick, 1969). For example, Twelfth Graders wrote longer clauses and more noun clauses than the Eighth Graders, differences which seemed to reflect the more mature writing ability of the older writers.

Many of the variables tabulated from the discourse samples in the Golub and Blount studies were also tabulated in the present research. Some variables, notably T-unit, stemmed from the research of Hunt (1965). His analysis of grammatical structures showed that the T-unit was a very reliable indicator of maturity of sentence structure. He defined T-unit as a main clause plus the subordinate clauses attached to it. A T-unit is thus the smallest grammatical unit into which a sentence can be segmented without producing sentence fragments.

The present study attempts to add to the knowledge of children's discourse in the manner of previous research by Strickland (1962), Loban (1963), Hunt (1965), Riling (1965), O'Donnell, Griffin, and Norris (1967), and Menyuk (1969). All of these researchers have attempted to describe and tabulate the kinds of structures used by children in their discourse. The present authors relate these structures to the linguistic ability of the student and to the rated quality of his discourse. The fruitfulness of this approach and the communalities between this and other research is discussed in the concluding chapter.

II
METHODOLOGY

SUBJECTS

The Ss were Fourth and Sixth Grade boys and girls in two public elementary schools in Beloit, Wisconsin. Eight classrooms containing a total of 211 Ss were used in the experiment. The mean IQ of the Ss as measured by the Otis Quick-Scoring Intelligence Test (Beta Form E) 6 months prior to the experiment was 104.6. There were no significant differences between the Fourth and Sixth Grade mean IQ, but females averaged 2.5 points higher than males ($t_{203} = 2.45$; $.01 < p < .05$). All 211 Ss participated but the data from only 160 were used in the present study. These 160 were randomly selected from the total group with the restriction that all cells in the experimental design have equal numbers. The 160 Ss consisted of 80 Fourth and 80 Sixth Graders with 40 boys and 40 girls within each grade. At the time of the experiment the median age of the Fourth Graders was 10 years, 0 months. The Sixth Graders' median age was 12 years, 0 months.

The classes contained about 8% nonwhite students. No attempt was made to differentiate between these and the white Ss in the analyses, and cells in the design were filled without regard to color.

DESCRIPTION OF MATERIALS

Pictures

A set of 20 different 8 x 10 photographs were prepared as stimuli for the written and oral discourse samples. The pictures were selected to represent a wide variety of topics and are described in detail in Appendix A. Ten of the pictures were developed in color while the other 10 were black and white. Pictures #1 through #10 were considered to be more concrete in form and content while Pictures #11 through #20 were more abstract. The ratings of concreteness and abstractness were obtained from 11 people who rated each of the 20 pictures on a 10-point scale from concrete to abstract. The composite rating, the average of the 11 scores for each picture, was then used to form the groups of ten concrete and ten abstract pictures. In each group of ten, five pictures were in color and five in black and white.

Directions

Two sets of written directions, both of approximately equal length, were prepared to accompany the pictures. One set was a general exhortation to the student to write something about the picture. The other set gave a few specific suggestions about things to look for and say about the pictures. Each set of instructions, general and specific, is given in Appendix B. For the taped, oral discourse samples, the set of specific directions was used, the only change being the replacement of the word "write" with the word "tell."

Linguistic Ability Test (LAT)

The LAT is a paper and pencil test of linguistic ability. It consists of 15 subsections containing a total of 148 items, and measures the S's ability to manipulate words and sentences as objects in the system of language. The specific kinds of tasks represented in the 15 subsections are presented in Appendix C. The item analysis data for each item and the reliability of each subsection of the test have been previously reported (Fredrick, Golub, & Johnson, 1970). The internal consistency of the LAT for the present group of Ss was .95, which indicates a very good set of test items. Eleven of the subsections had internal

consistency coefficients of .60 or above. Only these 11 were included in the set of variables for which correlations with writing measures were obtained.

EXPERIMENTAL PROCEDURES

Written Samples and *LAT*

The writing samples and the LAT scores were obtained on May 22 and 23, 1969. The writing sample was the first part of the experimental session and took place in the S's usual classroom. Two researchers administered the LAT and collected the written and oral discourse samples. The classroom teacher was present during these sessions.

The specific procedures in the writing session were kept as simple as possible. The Ss were given no advance indication about the kinds of activities they would be engaged in. The researchers entered each classroom shortly after the start of the morning or afternoon class period. The teacher introduced the researcher to his students and then told the class that it was participating in the testing of some research tools. The researchers gave each student an 8-page booklet with wide-ruled lines. Each student was randomly assigned a booklet containing a page of directions and one of the 20 photographs. The student read the directions silently and then began writing as instructed, using the photograph as stimulus. The researchers answered any questions and attempted to help students who appeared "stuck." After 25-minutes for writing and a 5-minute rest period the Ss began the LAT. This test was presented via a test booklet and tape recorder. The instructions for each subsection of the LAT were read by the recorded voice and many of the test items were also read. The recorded-voice procedure had the effect of pacing the Ss through the testing at a reasonable rate and eliminating much of the reading problem for the Ss (Fredrick, Golub, & Johnson, 1970). The researchers assisted Ss who had questions or difficulties. Generally such assistance was a rereading of the instructions, the example problem, and/or the item. No answers or hints to answers were verbally given. Two 5-minute rest periods were included in the LAT. The testing session with the writing sample and LAT proceeded without any significant problems.

Oral Samples

Two of the researchers returned to the school 2 weeks later and individually interviewed 40 of the original Ss. These Ss, equally divided between male and female, and between Fourth and Sixth Grade, participated for 10 minutes or less in the second session in which oral discourse samples were obtained. The situation consisted of a researcher and a student seated at a table in a study room (not the usual classroom) at school. All conversation was tape recorded and the S was aware of this fact. The S was asked to read the set of instructions, which were a slight modification of the "specific" set in Appendix B. The S was given the same picture as he had previously written about. After describing or narrating for about 3 minutes with the first picture, a second picture was presented and the S asked to talk specifically about it. During each oral sample, the researcher gave up to two prods if the S appeared "stuck." Thus, two samples of the S's oral discourse, one based on the same picture as used for his written discourse and the second based on another picture, were recorded. No significant problems were encountered in the collection of oral samples.

Tabulation of Measures

The written and oral samples were typed verbatim, and then checked for transcription accuracy. All tabulations of writing measures were made from the typed copies. The tabulations were made by trained personnel under the direction of the authors, who had previous experience in the analysis of discourse (Golub, 1967; Blount, Johnson, & Fredrick, 1969; Blount, Fredrick, & Johnson, 1969).

Rating of Written Samples

The written themes of the 80 Fourth Graders and the 80 Sixth Graders were given to three raters, whose task was to put each theme into one of four categories. Within each grade level the rater was to select the top 20 themes, the next 20, the next 20, and the poorest 20. The raters were instructed to put themes in a category on the basis of a general impression of quality. The definition of quality was left to the raters themselves. The raters were each people involved in the language arts area but not knowledgable about the experiment or the LAT. One rater was a former elementary school language arts teacher, another had previously taught remedial reading, and the third was one of the tabulators. The correlations between the ratings of these three raters were as follows:

1 and 2 -- .635
1 and 3 -- .655
2 and 3 -- .800

All themes that were put in the highest category by two or more of the raters became the set of themes with "high overall quality." All themes put in the lowest category by two or more of the raters became the set of "low overall quality" themes. The remaining themes consisted of those put consistently in the middle categories and those with little inter-rater consistency. The high quality set included 39 themes, the low quality set included 39 and the remaining 82 themes were of middle or uncertain quality. Of the high quality themes 21 were by Fourth Graders and 18 by Sixth Graders (recall that rankings had been assigned within grade levels); 14 were male and 25 female Ss, respectively. The low quality set included 20 Fourth Graders and 19 Sixth Graders, males and females were divided 30 to 9, respectively.

DESCRIPTION OF VARIABLES

The writing samples were extensively analyzed. A total of 63 measures was tabulated for each of the 160 written samples. Of these 63 measures 36 were also tabulated for each of the oral samples. The reduction in the number of variables from written to oral samples was due to several factors. In some cases the variable was not readily available in the oral sample. For example, there was no way to determine the number of sentences or the number of words per sentence in oral speech, since such markers as capital letters and end punctuation are not used. Other times the variable could not accurately be determined or it was of marginal interest in the comparison of oral and written speech. Each of the 63 variables is described below. Variables 1-36 were tabulated from both the oral and written samples and the remainder were from the written samples only.

1. Total words—excluding words considered to be in fragments. Proper nouns, regardless of actual word count, were tabulated as one word. Contractions were counted as one word. Structures were counted as one or two words according to their proper form, regardless of how the subjects had written them. (Ex: eye lashes = one word.)

2. Form-class words—nouns, verbs, adjectives, and adverbs in the sample.

3. Function words—all words other than form-class words in the sample, i.e., total words minus form-class words. Includes prepositions, determiners, qualifiers, participles, modals, conjunctions.

4. Form per function words—ratio of the total number of form-class words in the sample to the total number of function words in the sample.

5. T-units—any combination of a subject noun phrase and a verb, including all object noun phrases, subordinate clauses, and modifiers attached to it; "...one main clause plus the subordinate clauses attached or embedded within it." In the oral samples, T-units were counted when the subject was missing but understood. (Ex: "Looks like...", "Could be...").

6. Words per T-unit (T-unit length)—ratio of the total number of words to the total number of T-units for each sample.

7. Clauses—both main and subordinate, "a structure containing a subject (or coordinated subjects) and a finite verb phrase (or coordinated verbs or phrases)."

8. Clauses per T-unit—ratio of the total numbers of clauses, both main and subordinate, to the total number of T-units in each sample.

9. Subordinate clauses—defined as a structure containing a subject noun phrase and a finite verb (or verb phrase), but which would not be grammatically correct if considered as an independent T-unit. The total subordinate clause count included subordinate noun, adjective, and adverb clauses, and various "other" clauses.

10. Words per clause (Clause length)—ratio of the total number of words to the total number of clauses in each sample.

11. Subordinate noun clauses—defined as a clause occurring in one of the functions common to a noun (subject or object of a verb, object of a preposition).

12. Subordinate adjective clauses—defined as a clause modifying a noun or a word used as a noun.

13. Subordinate adverbial clauses—defined as a clause which functions as an adverb, i.e., it modifies a verb, a verbal, an adjective, an adverb, or another clause.

14. "Other" subordinate clauses—subordinate clauses not functioning as noun, adjective, or adverb clauses. The clause following "looks like" or "seems like" accounted for almost all the "other" clauses tabulated.

15. Multi-clause T-units—containing a main clause and one or more subordinate clauses.

16. T-unit patterns—unique patterns as determined by the verb (transitive, intransitive, or form of "be," "become," or "seem") and what follows it (noun phrase, adjective, adverb, complement).

17. Single-base transforms—sentences appearing in the form of questions or imperatives, the passive or emphatic voice, expletive, or negative.

18. Modals—auxiliaries (will, would, shall, should, must, may, can, could, ought, might, have to, used to) that occur in conjunction with a principal verb, and express concepts of potentiality, possibility, and necessity.

19. Forms of be and have—verbs in the sample which are introduced by a form of "be" or "have" and have as a suffix either "-ing" or "-en."

20. Infinitives—"to" plus a verb or form of be.

21. Verb types—the total number of unique verbs in the samples (as opposed to the total number of verbs, which would include repetitions of some verbs).

22. Nouns—common and proper nouns, gerunds, and personal pronouns in the sample. (Pronouns used as expletives (usually "it") were not included as nouns.)

23. Determiners—including the articles the, a, an, and all cardinal and ordinal numbers.

24. Adjectives—including reflexive pronouns, days of the week used as modifiers, and "right" or "left" when used with words such as "hand" or "foot."

25. Prepositional phrases—having the structure prep + NP. Constructions such as "in back of" or "on top of" were considered a single preposition.

26. Nouns per T-unit--ratio of the total number of nouns to the total number of T-units for each sample.

27. Determiners per noun—ratio of the total number of determiners to the total number of nouns for each sample.

28. Adjectives per noun—ratio of the total number of adjectives to the total number of nouns for each sample.

29. Qualifiers—including most indefinite pronouns used as noun modifiers and indicating unspecified quantity. (Much, more, some, any).

30. Possessives—including possessive pronouns and possessives formed by adding "'s" to proper nouns.

31. Total adverbs—and adverbial phrases, regardless of function. Phrases such as "one night" or "next day" were considered one adverbial phrase. Constructions such as "right there" or "up here," especially in the oral samples, were considered to be two adverbs.

32. Initial adverbs—which occurred as the first word of a T-unit.

33. Adverbs before the verb—exclusive of those in the initial position.

34. Adverbs after the verb—exclusive of those in the final position.

35. Final adverbs—which occurred as the last word in a T-unit.

36. Adverbs per T-unit—ratio of the total number of adverbs to the total number of T-units for each sample.

37. Participial adjective endings—formed by adding a suffix to a participle or adjective. (Ex: a turning wheel, a colored object)

38. Adjective endings—adjectives formed by adding a suffix to another form-class word. (Ex: descriptive, beautiful, worthy)

39. Adverb endings—adverbs formed by adding a suffix to another form-class word. (Ex: quickly, sideways, likewise)

40. Noun endings—nouns formed by the addition of a suffix to another form-class word. (Ex: meaning, ending, description)

41. Plural endings—plurals formed by adding -s or -es to a noun or noun equivalent.

42. Possessive endings—formed by adding 's to a noun phrase.

43. -ing verb endings—verbs in the sample having the suffix, -ing.

44. Past tense endings—past forms of finite verbs formed by adding -ed.

45. Participial -ed—participles having either the ending -ed or -en. (This excluded past forms of finite verbs.)

46. Participial -ing—participles having the ending -ing. (This excluded finite verbs with -ing suffixes.)

47. Total suffixes—including plurals; possessives; participle -ed, -en, and -ing endings; noun, adjective and adverb endings; participial adjective endings; and past form endings.

48. Suffixes per words—ratio of the total numbers of suffixes to the total number of words for each sample.

49. Sentences—as defined by the S's use of periods and capitalization.

50. Words per sentence (Sentence length) —ratio of the total number of words to the total number of sentences for each sample.

51. T-units per sentence—ratio of the total number of T-units to the total number of sentences for each sample.

52. Coordinated T-units—T-units were considered coordinated when they were not separated by the period and capitalization which indicate a new sentence.

53. Coordinated verbs—finite verbs joined by a coordinating conjunction or a comma to another verb, and taking the same subject noun phrase as that verb.

54. Coordinated nouns—compound subject or object noun phrases, i.e., the number of nouns linked by a conjunction, comma, or semi-colon (which may be omitted in a grammatically incorrect sentence) to another noun.

55. Relative clauses—subordinate adjective clauses introduced by a definitive relative pronoun (who, whose, which, what, that).

56. Participial phrases—which took a complement and demonstrated the structure, part + NP.

57. Adverbs in noun phrases—defined as a word modifying a verb, a verbal, another adverb, an adjective, or a clause. The category included adverbs of time, place, manner, comparison, degree, negation, conjunction, cause, condition, and probability, as well as the expletive "there," compound forms such as "instead of" or "because of," and the word "about" in all its functions excluding its use as a preposition.

58. Adverbs of time—which answer the question "when?" (Ex: when, then, once, ago, while, etc.)

59. Adverbs of place—which answer the question "where?" (Ex: there, up, in, home (as in, "to go home"), etc.). Adverbs of place such as "in" and "out," though often integrally connected with the verb (to throw something out, to have something on, to wear something out) were consistently tabulated as adverbs rather than two-part verbs (except, of course, when such words functioned as prepositions).

60. Adverbs of manner—which answer the question "how?" including almost all words ending in -ly (Ex: quickly, happily, well, etc.).

61. Other adverbs—which were not adverbs of time, place, or manner. This included adverbs of degree (greatly), probability (probably), conjunction, (however), negation (not), condition (if), cause (because), comparison (better), etc., and the expletive "there".

62. Prefixes—the total number of separable prefixes (Ex: un-, pre-, con-) in the sample.

63. Words in fragments—occurred when either the entire verb or subject noun phrase was missing. In the oral samples, where answers to direct questions of the interviewer began with words like "because" (since the question supplied what would otherwise be the main clause of the answer) and would normally be counted as fragments, the first word was dropped and the remainder considered as a T-unit. Phrases like "you know" and "you see," when used as "asides," were considered fragments. Direct discourse was omitted whenever the subject quoted someone or something else, but was included when it was an original construction used in telling a story.

EXPERIMENTAL DESIGN AND ANALYSES

Factorial Experiments

The scores on the LAT and writing samples were collected from all 211 Ss. The differences between Fourth and Sixth Graders and between males and females on the Linguistic

Ability Test have already been reported (Fredrick, Golub, & Johnson, 1970). For the analysis of the written measures, 160 of the students were selected to complete the 32 cells of a 5-factor experimental design. The five factors were:

1. Grade level - 4 or 6
2. Sex of S - male or female
3. Writing directions - specific or general
4. Picture content - abstract or concrete
5. Picture format - color or black-and-white

Each factor was tested for significant effects by a fixed-effects model analysis of variance for each of the 78 variables. In addition, the 63 variables from the written samples were tested for significant effects by a multivariate test.

The 40 Ss from whom oral samples were obtained constituted a 16-cell, 4-factor experimental design. The factors included:

1. Picture used - same as for written sample or another not previously seen
2. Grade level - 4 or 6
3. Sex of S - male or female
4. Picture content - abstract or concrete

All Ss in the oral samples worked from the set of specific directions, hence the disappearance of this factor in the oral sample. Picture color could have been included, but it would have used most of the degrees of freedom available. Since it was felt that enough was learned about this variable in the written mode, it was deleted from the oral analysis. The four factors listed above were tested with each of the 36 variables tabulated from the oral samples. The effects of the variables overall were examined by multivariate techniques.

The 36 variables that were common to the written and oral samples were tested for significant effects due to oral or written mode with a one-way analysis of variance. Each S's written discourse was compared to the oral discourse resulting from the same picture. Forty Ss, representing equal numbers of each grade and sex category and two uses of each of the 20 different pictures, were included in the oral-written comparison.

A final experiment involved the ratings given to each of the written themes. All themes in the category "High overall quality" were compared to the grand mean on each of the 78 variables. Also, all themes in the "Low overall quality" were compared to the grand mean. These comparisons to the mean are known as deviation contrasts and produce a significance test of a group's deviation from the overall mean. The comparisons in the other experiments discussed in this section were "simple contrasts" rather than deviation contrasts since in each case the mean of one group was compared to the mean of another.

Correlations

The correlation between the writing measures and each of the LAT test scores were obtained and tested for significance. In all cases the correlation coefficient was a within-cell product-moment coefficient. The within-cell correlation is computed from the squares of differences between each score and the respective cell mean. Computed in this manner rather than from the grand mean, the coefficient does not reflect the effects of the differences in treatment across cells but represents the true amount of relationship irrespective of treatment.

III
RESULTS

THE *LAT*

The reliability (Hoyt internal consistency) of the LAT with this group of 211 Ss was .95. Analysis of the 15 sections as subtests showed that eleven subtests (all except sections I, XI, XIV, and XV; see Appendix C for brief description of sections) had Hoyt reliability coefficients above .60. These eleven sections were used in the comparisons to follow, and the four sections having lower reliability were not used. The Sixth Graders were significantly superior ($p < .01$) to Fourth Graders on all sections except IV (see Fredrick, Golub, & Johnson, 1970). Females were superior to males on Sections III, VI, and VIII ($p < .02$). Within a grade level, the LAT correlated .77 with IQ score.

In the following comparisons, only the data from the 160 Ss whose written discourse was analyzed are used. The relationship of the LAT scores to the 63 variables extracted from the writing samples was marginal. Of the 693 correlations in the 11 x 63 matrix, 515 were not significantly different from zero at the .05 level ($/r/ \leq .195$), another 91 correlations were significant at the .05 level but not at the .01 level ($.195 < r \leq .254$) and the remaining 87 correlations were statistically significant. Of these 87 significant correlations only 24 accounted for as much as 10% of the common variance ($r > .316$), and only one correlation showed as much as 20% common variance. This latter correlation of .48 showed the relationship between the score on Section II and the types of sentence patterns used. The greater a S's ability to judge the wordiness of the items in Section II, the more types of different sentence patterns would that S employ in his discourse.

The other 23 correlations, which had values between .32 and .38, were as follows: Section II scores predicted the quantity of words, including form-class words, function words, nouns, infinitives, and suffixes. Section II also predicted numbers of sentences, clauses, and single-based transforms. Section VIII, use of the deletion transform, predicted a smaller number of sentence fragments in the discourse samples. Section IX, judgments of the equivalence of phoneme sounds, predicted more extensive use of suffixes and past tense endings. Section XII, evaluation of well-formed sentences, predicted more extensive use of types of sentence patterns; a greater quantity of discourse including words, form-class words, function words, and nouns; and more sentences, clauses, multi-clause T-units, past tense endings, and suffixes. Section XIII, expansion of the verb phrase, predicted the use of adverb modifiers in the medial position after the verb.

The total LAT score also predicted some of the above variables marginally. The higher the LAT score the greater the quantity of words, sentences, clauses, subordinate clauses, multi-clauses, multi-clause T-units, types of sentence patterns, nouns, infinitives, suffixes, form-class words, and function words (all correlations between .31 and .36). [As a matter of comparison, IQ scores accounted for up to 10% of the variance for only one variable, the use of suffixes attached to nouns ($r = .35$).]

The general impression given by the patterns of correlation between the LAT and the writing measures was that, at a low level of prediction, the LAT scores provided some information about the quantity and complexity of writing.

The LAT was compared to the composite rating of theme quality. This composite score ranged from 3 points to 12 points. Three points resulted if all three raters independently judged the theme to be in the highest quartile on the basis of overall quality. Twelve points meant that the theme was

judged in the lowest quartile by all three raters. The correlation between this composite rating and the total LAT score was -.73. The LAT and the quality of discourse showed over 53% common variance. For comparison, when IQ score was compared to the composite rating of theme quality, the correlation was -.63, showing about 40% common variance.

An additional measure was developed and compared with the LAT score. The errors, including lexical and syntactic deviations and omissions, were counted. The correlation between this number of errors and theme quality was +.25; the more errors, the poorer the rated quality. When the errors were divided by the number of words to arrive at an error density measure, this correlated with the rated quality +.64; the more errors per number of words, the poorer the rating. LAT scores correlated with error density -.60; the higher the LAT score, the lower the error density. Error density and IQ correlated -.52.

GRADE AND SEX DIFFERENCES IN WRITING

The means of the Ss on the 63 writing measures are given in Table 1. These means are based on the data from 160 Ss, and are given according to the grade, sex, type of writing stimulus used, and rated quality of writing. The means and standard deviations of scores of the entire group are also given for each variable.

Table 1

Scores on Measures Obtained from Written and Oral Discourse

Group	N	(1) Total Words	(2) Form-class Words	(3) Function Words	(4) Form Function Words	(5) T-Units	(6) Words per T-Unit
Written Discourse							
Grand Mean	160	126.2	69.6	56.6	1.28	12.6	10.7
Stan. Dev.		60.9	33.4	29.4	.33	6.7	3.0
Grade 4	80	124.7	68.9	55.8	1.29	13.6**	9.5
Grade 6	80	127.8	70.4	57.4	1.27	11.6	11.8***
Male	80	105.0	57.7	47.3	1.25	10.6	10.7
Female	80	147.5***	81.5***	65.9***	1.31	14.7***	10.6
Specific	80	124.3	68.2	55.9	1.26	12.1	11.0
General	80	127.2	71.0	57.2	1.30	13.1	10.4
Concrete	80	130.5	72.0	58.4	1.29	13.2	10.6
Abstract	80	122.0	67.2	54.7	1.27	12.0	10.8
Bl. & Wh.	80	133.9*	73.8*	60.1	1.26	13.2	10.9
Color	80	118.6	65.4	53.0	1.30	11.9	10.4
High	39	176.6***	95.9***	80.7***	1.23	17.7***	10.6
Medium	82	129.9	72.2	57.7	1.30	12.6	10.9
Low	39	68.2***	37.9***	30.0***	1.30	7.5***	10.1
Oral Discourse							
Grand Mean	80[a]	100.6	61.8	38.8	1.70	11.0	9.3
Stan. Dev.		58.3	37.0	22.5	.52	6.9	2.1
Picture 1	40	101.6	62.2	40.3	1.66	11.0	9.7*
Picture 2	40	97.7	61.3	37.3	1.74	11.1	8.9

[a]In the oral discourse each of 40 Ss provided two samples.
*, **, & ***Significant at the .10, .05, and .01 levels, respectively. The high mean in each significant comparison is marked except for Low vs. Medium where the low mean is marked.

Table 1 continued

Group	N	(1) Total Words	(2) Form-class Words	(3) Function Words	(4) Form Function Words	(5) T-Units	(6) Words per T-Unit
Oral Discourse cont.							
Grade 4	40	106.9	64.6	42.3	1.54	11.6	9.6
Grade 6	40	94.3	59.0	35.3	1.86***	10.5	9.1
Male	40	102.0	62.4	39.5	1.71	10.7	9.6
Female	40	99.2	61.1	38.1	1.68	11.4	9.1
Concrete	40	97.0	60.7	36.2	1.77	10.7	9.4
Abstract	40	104.2	62.9	41.4	1.62	11.4	9.3
Oral vs. Written							
Written	40	115.6	66.2	49.4*	1.40	11.2	11.0**
Oral	40	102.6	62.2	40.3	1.66***	11.0	9.7

	(7) Clauses	(8) Clauses per T-Unit	(9) Subor-dinate Clauses	(10) Words per Clause	(11) Sub. Noun Clauses	(12) Sub. Adj. Clauses	(13) Sub. Adv. Clauses
$\bar{X}$	17.8	1.45	5.2	7.6	1.30	1.11	1.23
SD	9.4	.37	4.1	1.8	1.89	1.39	1.58
G4	18.3	1.34	4.6	7.4	1.25	.79	1.21
G6	17.3	1.57***	5.7*	7.8	1.35	1.44***	1.25
Ma	14.7	1.44	4.1	7.7	.99	.96	.96
Fe	20.9***	1.45	6.2***	7.5	1.61**	1.26	1.50**
Sp	17.3	1.46	5.1	7.7	1.28	1.06	1.04
Gn	18.4	1.43	5.3	7.4	1.33	1.16	1.43
Ct	18.7	1.48	5.5	7.2	1.46	1.07	1.53**
Ab	17.0	1.42	4.9	7.9**	1.14	1.15	.94
BW	19.2**	1.54***	6.0***	7.3	1.55*	1.07	1.53**
Cr	16.4	1.36	4.4	7.8*	1.05	1.15	.94
Hi	24.8***	1.43	7.1	7.5	1.97	1.49	1.54
Med	18.5	1.50	5.8	7.6	1.33	1.22	1.49
Lo	9.4***	1.37	2.0***	7.6	.56***	.51***	.38***
$\bar{X}$	15.5	1.43	4.5	6.7	.82	.67	1.00
SD	10.0	.27	3.9	1.3	1.43	.76	1.60
P1	15.6	1.42	4.6	6.9**	.90	.60	1.08
P2	15.5	1.43	4.3	6.4	.75	.74	.93
G4	15.7	1.35	4.1	7.2***	.62	.77	.73
G6	15.4	1.49**	4.8	6.2	1.03	.57	1.27*
Ma	15.0	1.40	4.3	6.9	.72	.77	.99
Fe	16.0	1.45	4.6	6.5	.92	.57	1.01
Ct	15.3	1.47	4.5	6.5	.97	.56	1.17
Ab	15.8	1.38	4.4	6.9	.68	.78*	.84
Wr	16.2	1.49	5.0	7.4	.98	1.25	1.25
Or	15.6	1.42	4.6	6.9	.90	.60	1.08

Table 1 continued

	(14) Other Sub. Clauses	(15) Multi-Clause T-Units	(16) T-Unit Patterns	(17) Single Base Transforms	(18) Modals	(19) Be & Have Forms	(20) Infini-tives
$\bar{X}$	1.51	4.21	6.77	2.76	2.24	2.86	.78
SD	2.21	3.18	2.48	2.40	2.42	2.34	1.17
G4	1.35	4.00	6.66	2.78	1.84	2.87	.68
G6	1.66	4.41	6.87	2.75	2.64**	2.84	.88
Ma	1.24	3.38	6.11	2.60	1.85	2.98	.50
Fe	1.77	5.04***	7.42***	2.92	2.63**	2.74	1.05***
Sp	1.66	4.08	6.79	2.83	1.96	3.15*	.83
Gn	1.35	4.34	6.75	2.70	2.51	2.56	.73
Ct	1.40	4.35	6.96	2.88	2.49	3.02	.84
Ab	1.61	4.06	6.57	2.65	1.99	2.69	.71
BW	1.76	4.80**	7.27***	3.21**	2.61**	3.14	.81
Cr	1.25	3.61	6.26	2.31	1.86	2.58	.74
Hi	1.95	5.92	8.28	3.92**	2.77	3.62	1.23
Med	1.77	4.60	7.24	2.70	2.70	2.84	.78
Lo	.51***	1.67***	4.26***	1.71***	.74***	2.13***	.31***
$\bar{X}$	1.88	3.66	5.69	2.87	2.00	1.76	.58
SD	2.19	3.04	2.08	2.68	2.51	1.82	1.14
P1	1.88	3.65	5.50	2.95	2.05	1.73	.57
P2	1.88	3.66	5.88	2.80	1.95	1.80	.59
G4	1.94	3.53	5.62	3.09	1.92	1.87	.67
G6	1.82	3.78	5.76	2.65	2.08	1.66	.50
Ma	1.83	3.57	5.74	2.78	1.51	1.73	.52
Fe	1.93	3.75	5.64	2.96	2.49*	1.80	.64
Ct	1.84	3.70	6.20*	2.92	2.02	1.94	.83*
Ab	1.92	3.62	5.20	2.83	1.98	1.58	.34
Wr	1.50	4.02	6.58**	2.68	2.05	2.02	.70
Or	1.88	3.65	5.50	2.95	2.05	1.72	.58

	(21) Verb Types	(22) Nouns	(23) Deter-miners	(24) Adjec-tives	(25) Preposi-tional Phrases	(26) Nouns per T-Unit	(27) Deter-miners /Noun	(28) Adjec-tives /Noun
$\bar{X}$	8.6	37.2	15.6	5.1	9.52	3.14	.44	.14
SD	5.7	18.0	8.7	4.4	5.93	1.02	.16	.11
G4	9.8***	37.5	15.2	4.7	9.16	2.86	.45	.13
G6	7.5	36.9	16.0	5.5	9.88	3.42***	.43	.15
Ma	6.2	30.9	13.7	4.5	8.31	3.11	.47**	.15
Fe	11.1***	43.5***	17.6***	5.7*	10.73***	3.16	.41	.14
Sp	8.3	36.2	16.2	5.3	9.60	3.16	.47*	.15
Gn	8.9	38.1	15.0	4.9	9.44	3.11	.41	.13
Ct	9.0	37.5	16.1	5.1	9.19	2.97	.44	.13
Ab	8.3	36.8	15.2	5.1	9.85	3.30**	.45	.15

Table 1 continued

	(21) Verb Types	(22) Nouns	(23) Determiners	(24) Adjectives	(25) Prepositional Phrases	(26) Nouns per T-Unit	(27) Determiners /Noun	(28) Adjectives /Noun
BW	9.3	39.0	16.1	4.9	10.19	3.20	.42	.12
Cr	8.0	35.3	15.2	5.3	8.85	3.08	.46*	.16**
Hi	12.6***	51.2***	21.9***	7.1*	14.10***	3.00	.44	.14
Med	8.2	38.1	15.4	5.1	9.48	3.22	.42	.14
Lo	5.6***	21.0***	9.9***	3.1***	5.03***	3.10	.48*	.15
$\bar{X}$	7.2	29.8	11.0	3.3	6.51	2.80	.38	.12
SD	3.6	17.2	6.4	2.4	4.00	.70	.16	.08
P1	7.1	29.8	11.1	3.7*	6.35	2.88	.37	.14
P2	7.3	29.7	11.0	2.8	6.66	2.72	.39	.10
G4	7.3	31.8	11.9	3.2	8.03***	2.87	.38	.11
G6	7.1	27.7	10.2	3.4	4.98	2.73	.37	.13
Ma	7.1	30.0	12.4*	3.2	7.43*	2.88	.42**	.11
Fe	7.3	29.5	9.6	3.3	5.58	2.72	.34	.13*
Ct	7.9	28.5	9.6	3.3	6.11	2.75	.34	.13
Ab	6.5	31.0	12.4**	3.3	6.90	2.85	.41**	.11
Wr	7.6	34.9	13.3	4.8***	8.85**	3.36**	.40	.13
Or	7.1	29.8	11.1	3.8	6.35	2.87	.37	.14

	(29) Qualifiers	(30) Possessives	(31) Total Adverbs	(32) Initial Adverbs	(33) Adverbs Before Verb	(34) Adverbs After Verb	(35) Final Adverbs	(36) Adverbs per T-Unit
$\bar{X}$	1.71	1.91	10.3	2.06	1.85	4.84	1.55	.82
SD	1.85	2.54	6.9	2.51	2.12	3.65	1.60	.41
G4	1.88	2.34**	9.7	2.58***	1.60	4.00	1.54	.68
G6	1.54	1.48	10.9	1.54	2.10	5.68***	1.56	.96
Ma	1.36	1.54	7.8	1.68	1.38	3.46	1.24	.78
Fe	2.05**	2.28*	12.9***	2.44**	2.33***	6.21***	1.86***	.87
Sp	1.59	1.89	9.6	1.85	1.55	4.71	1.49	.80
Gn	1.83	1.93	11.0	2.26	2.15*	4.96	1.61	.84
Ct	1.54	2.29*	11.8***	2.16	2.21**	5.64***	1.75*	.91***
Ab	1.88	1.53	8.8	1.95	1.49	4.04	1.35	.74
BW	1.89	2.11	11.4**	2.31	2.14*	5.26	1.65	.88*
Cr	1.53	1.70	9.2	1.80	1.56	4.41	1.45	.77
Hi	2.33	3.30***	14.8*	3.10*	2.77	6.95	1.95	.87
Med	1.70	1.80	10.8	1.98	2.00	5.21	1.62	.88
Lo	1.10***	.74***	4.7***	1.18***	.62***	1.95***	1.00***	.66***
$\bar{X}$	1.40	1.22	13.2	1.97	2.99	5.98	2.04	1.12
SD	1.39	1.75	9.7	2.10	2.75	5.27	1.96	.51
P1	1.45	1.50	13.1	1.90	3.38	5.68	2.00	1.20
P2	1.36	.94	13.3	2.04	2.60	6.38	2.07	1.05

Table 1 continued

	(29) Qualifiers	(30) Possessives	(31) Total Adverbs	(32) Initial Adverbs	(33) Adverbs Before Verb	(34) Adverbs After Verb	(35) Final Adverbs	(36) Adverbs per T-Unit
G4	1.94***	1.34	13.9	2.19	3.16	5.97	2.26	1.16
G6	.87	1.10	12.5	1.75	2.81	5.98	1.81	1.08
Ma	1.46	.99	14.1	1.91	2.94	6.54	2.31	1.26**
Fe	1.34	1.45	12.3	2.03	3.03	5.41	1.77	.99
Ct	1.27	1.33	13.6	2.11	2.76	6.19	2.23	1.16
Ab	1.54	1.11	12.8	1.84	3.21	5.76	1.84	1.09
Wr	2.00	1.22	10.5	2.08	1.72	5.20	1.48	.95
Or	1.45	1.50	13.1	1.90	3.38***	5.68	2.00	1.20**

Group	N	(37) Participial Adjective Endings	(38) Adjective Endings	(39) Adverb Endings	(40) Noun Endings	(41) Plural Endings	(42) Possessive Endings
Written Discourse							
Grand Mean	160	.33	1.50	.55	.78	4.83	.34
Stan. Dev.		.83	1.78	1.07	1.35	4.30	.94
Grade 4	80	.29	1.23	.46	.63	4.79	.45
Grade 6	80	.38	1.78**	.64	.94	4.86	.22
Male	80	.35	1.13	.44	.61	4.31	.26
Female	80	.31	1.88***	.66	.95*	5.34	.41
Specific	80	.33	1.48	.48	.64	4.86	.39
General	80	.34	1.53	.63	.93	4.79	.29
Concrete	80	.34	1.59	.70*	.84	4.63	.40
Abstract	80	.33	1.41	.40	.73	5.03	.28
Bl. & Wh.	80	.34	1.53	.56	.73	5.04	.44
Color	80	.33	1.48	.54	.84	4.61	.24
High	39	.56**	2.26	1.13***	1.31*	6.05	.72**
Medium	82	.22	1.57	.46	.77	4.79	.26
Low	39	.33	.59***	.15***	.28***	3.67**	.13**

Group	N	(43) -ing Verb Endings	(44) Past Tense Endings	(45) Participial -ed	(46) Participial -ing	(47) Total Suffixes	(48) Suffixes per Word
Written Discourse							
Grand Mean	160	1.99	1.14	.51	.88	13.0	.10
Stan. Dev.		2.03	2.63	.99	1.24	7.7	.05
Grade 4	80	2.09	1.43	.33	.70	12.7	.10
Grade 6	80	1.89	.86	.50	1.06*	13.3	.11
Male	80	1.94	.70	.46	.81	11.2	.11
Female	80	2.04	1.59**	.56	.95	14.8***	.10
Specific	80	2.20	1.00	.56	1.04*	13.1	.11
General	80	1.78	1.29	.46	.73	12.9	.09
Concrete	80	2.04	1.10	.51	.94	13.3	.10
Abstract	80	1.94	1.19	.51	.83	12.7	.11

Table 1 continued

Group	N	(43) -ing Verb Endings	(44) Past Tense Endings	(45) Participial -ed	(46) Participial -ing	(47) Total Suffixes	(48) Suffixes per Word
Bl. & Wh.	80	2.15	1.15	.65*	.90	13.7	.10
Color	80	1.83	1.14	.38	.86	12.2	.10
High	39	2.10	2.82***	.79	1.21	19.2***	.11
Medium	82	2.16	.80	.50	.82	12.5	.10
Low	39	1.51*	.18***	.26**	.69	7.9***	.10

	(49) Sentences	(50) Words per Sentence	(51) T-Units per Sentence	(52) Coordinated T-Units	(53) Coordinated Verbs	(54) Coordinated Nouns	(55) Relative Clauses	(56) Participial Phrases
$\bar{X}$	10.6	12.6	1.21	2.4	.84	2.33	1.06	.26
SD	5.6	3.4	.24	2.6	1.27	2.50	1.34	.61
G4	11.5	11.2	1.20	2.4	.76	2.18	.73	.18
G6	9.7	14.0***	1.21	2.5	.92	2.48	1.39***	.34*
Ma	8.8	12.9	1.23	2.1	.55	1.94	.89	.21
Fe	12.4***	12.4	1.19	2.7	1.14***	2.71**	1.23*	.30
Sp	10.4	12.7	1.19	2.3	.81	2.44	1.04	.26
Gn	10.8	12.6	1.23	2.5	.87	2.21	1.08	.25
Ct	10.8	12.8	1.25**	2.7	.90	1.93	1.00	.26
Ab	10.3	12.5	1.17	2.2	.79	2.73**	1.11	.25
BW	11.0	13.1*	1.22	2.4	.92	2.34	1.02	.16
Cr	10.2	12.2	1.19	2.5	.76	2.31	1.10	.35**
Hi	15.5***	11.8*	1.13	2.3	1.38	2.56	1.44	.23
Med	10.6	13.0	1.20	2.3	.85	2.40	1.13	.26
Lo	5.6***	12.6	1.29***	2.8	.28***	1.92	.51***	.28

	(57) Adverbs in Noun Phrases	(58) Adverbs of Time	(59) Adverbs of Place	(60) Adverbs of Manner	(61) Other Adverbs	(62) Prefixes	(63) Words in Fragments
$\bar{X}$	.89	1.64	1.82	1.16	5.68	.12	2.8
SD	1.28	2.49	1.92	1.57	4.37	.37	6.6
G4	.81	1.92	1.86	.89	5.04	.09	3.4
G6	.97	1.36	1.77	1.44**	6.31*	.15	2.2
Ma	.57	.86	1.55	.80	4.54	.15	3.3
Fe	1.21***	2.42***	2.09*	1.53***	6.81***	.09	2.3
Sp	.82	1.30	1.76	1.15	5.39	.09	2.9
Gn	.96	1.99*	1.88	1.18	5.96	.15	2.7
Ct	.90	1.90	2.01	1.21	6.65***	.15	1.9
Ab	.89	1.39	1.63	1.11	4.70	.09	3.7*
BW	.80	2.05**	1.98	1.16	6.18	.23***	2.7
Cr	.99	1.24	1.66	1.16	5.18	.01	2.9
Hi	1.21	2.54	2.72*	1.69	7.85	.21	1.2
Med	.99	1.73	1.78	1.24	6.05	.10	2.5
Lo	.38***	.56***	1.00***	.46***	2.72***	.08	5.1***

The differences between the present groups of Fourth and Sixth Grade Ss were as follows: Fourth Graders (G4) wrote, on the average, two more sentences per theme than Sixth Graders (G6), but G6 sentences were longer by about three words per sentence (11.2 vs. 14.0 words per sentence); G6 also displayed longer T-units, which included more clauses per T-unit in the form of subordinate clauses, especially adjective clauses; G6 used more modals with the verb, but fewer unique verbs than G4; G4 used more possessives, but fewer participial phrases, relative clauses, adverbs of manner, other adverbs, and adverbs per T-unit than G6; G4 tended to use adverbs in an initial position in the sentence more so than G6, while G6 tended to use adverbs medially after the verb; G6 used more nouns per T-unit than G4; and G6 also used more participial -ing endings and adjectival endings on words than did G4.

Some of the variables that did not differentiate G4 from G6, and which one might have expected to do so are also worth noting. For example, the two grades did not differ significantly on the total number of words written, on the numbers of words in fragments, on the use of multi-clause T-units, nor in the number of T-unit patterns displayed.

In quantity of writing the difference between grade levels were not as great as those between the sexes. Girls wrote far more extensively than boys as evidenced by numbers of words, sentences, T-units, and clauses. Girls used more subordinate clauses, especially noun and adverb clauses, than boys. They displayed more frequent use of multi-clause T-units and a greater variety of T-unit patterns. Girls also used more modals, more infinitives, more coordinated verbs, more verb types, more nouns, determiners, qualifiers, adjectives, possessives, adverbs of all kinds and in all positions, coordinated nouns, prepositional phrases, and suffixes, most of these differences stemming from the sheer greater bulk of writing done by the girls. On measures involving some control for sheer quantity, such as sentence length, T-unit length, T-units per sentence, clauses per T-unit, clause length, nouns per T-unit, adjectives per noun, adverbs per T-unit, and suffixes per word, the differences were not significant between males and females. Only on the variable, determiners per noun, were the boys significantly higher than the girls. The differences between sexes rested largely in the quantity of writing. However, it can be seen in Table 1 that though boys wrote 70% as many words, they used substantially fewer than 70% as many infinitives, adverbs in the noun phrase, medial adverbs, adverbs of time and manner, past endings, verb types, and coordinated verbs, but actually had more words in fragments, and more be and have forms than the girls. These differences over and above quantity of writing may indicate less facility for boys in the use of structures such as adjectives, adverbs, and verbs.

The themes of the boys and girls were also compared on the rated quality as assigned the themes by three competent judges. These ratings showed that themes written by the girls were judged to be of significantly better quality ($p < .001$) than those written by boys. The average rating, where a lower number indicates higher quality, for girls was 6.7, compared to boys at 8.3 (t test value with 158 df was equal to 3.47).

THE WRITING STIMULI

Three factors were embedded in the stimuli used in obtaining the written sample. These factors were two levels each of instructions, picture format, and picture content. Instructions were either specific or general, format was either color or black-and-white, and content was either abstract or concrete. These levels were combined in a factorial design and analyzed for main effects and interactions.

The effects that resulted from the factor of instruction were not generally significant. The numbers of words, sentences, clauses, T-units, and so on were essentially the same for both groups, and no basic differences in complexity or quantity of writing occurred. Only three of the 63 variables approached statistical significance. The themes written under specific instructions included slightly more determiners per noun, and slightly fewer adverbs of time and adverbs in a medial position before the verb than those written following the more general instructions. The rated quality of the themes written under each set of instructions was exactly the same.

The effect of color vs. black-and-white was significant for a number of variables. Several kinds of structures appeared more often in the themes written in response to black and white pictures. For example, black-and-white pictures produced more clauses, especially subordinate noun and adverb clauses; it also resulted in more types of sentence patterns, more clauses per T-unit, more multi-clause T-units, more single-base transforms, more modals, more adverbs, especially adverbs of time, and more prefixes than did the color pictures. The color pictures, however, brought about more adjectives

and participial phrases, and slightly longer clauses.

The importance of content is borne out by the third variable, the concrete-abstract dimension. Abstract pictures were more difficult to write about and students tended to have trouble expressing themselves in fluid structures. Many fragments and false sentence starts occurred and often students resorted to writing lists of nouns, tabulating what they saw in the abstract picture.

The concrete pictures produced more adverbial clauses and adverbial modification than the abstract pictures. Such adverbial modification is indicative of the larger amount of story telling and explanation produced from the concrete pictures.

The composite rating of the overall quality of the themes went from 3 points for the best theme to 12 for the poorest. The black and white pictures produced somewhat better themes than the color pictures (7.1 compared to 7.9) but this was not statistically significant. The concrete pictures produced better themes (7.2 compared to 7.8) than the abstract pictures but again the differences were not significant.

RATINGS OF THEME QUALITY

Three raters graded the set of Fourth Grade themes and also the set of Sixth Grade themes. Within each set of 80, the raters were to select the 20 best themes, the next best 20, the next 20, and the poorest 20 themes. The 39 themes with the best average rating and the 39 themes with the poorest rating were then compared to the remaining 82 themes that comprized the middle mediocre group. The means on the 63 measures of writing structures were as shown in Table 1.

The main differences between the high quality themes and the average themes were the number of sentences ($p < .001$) and words ($p < .003$). High themes contained 177 words in approximately 15.5 sentences while the average theme was 130 words in 10.6 sentences. The low quality theme showed only 68 words in 5.6 sentences, and the numbers of words and sentences were significantly below the average ($p < .0001$). On all other measures that are largely dependent on the length of discourse, the high and low themes were significantly different from the grand mean. Thus, because of the greater number of words and sentences, high quality themes also showed more T-units ($p < .002$), clauses ($p < .01$), single-base transforms ($p < .04$), verbs ($p < .003$), nouns ($p < .005$), determiners ($p < .001$), adjectives ($p < .07$), possessives ($p < .01$), prepositional phrases ($p < .001$), adverbs ($p < .06$), and suffixes ($p < .002$) than the average themes, while low quality themes contained fewer of each of the above ($p < .001$). The low themes also contained fewer types of sentence patterns, multi-clause T-units, modals, be and have forms, coordinated verbs, qualifiers, infinitives, and relative clauses, and more sentence fragments than average. However, in measures in which quantity of writing was controlled, the differences between themes of various quality were much less. High and average themes did not differ significantly in words per clause, nouns per T-unit, determiners per noun, adjectives per noun, adverbs per T-unit, words per sentence, words per T-unit, T-units per sentence, clauses per T-unit, suffixes per words, nor in the number of form words per function words. Of the above measures only one, T-units per sentence, was significantly different between the low and average themes. Low ability Ss had slightly more T-units per sentence than the average, a statistic that probably reflects omissions of necessary punctuation in the low quality writing. Thus, while the differences reflecting quantity of writing are clearly significant, the complexity of sentence structure appears to vary only slightly.

The high quality themes showed more prefixes and suffixes. Subjects writing these themes used more plural forms, more possessive forms, more -ed, -ing, past, and participle endings, and more words with noun, adjective, and adverb endings than Ss writing poorer quality themes. The high themes showed 19 suffixes per theme compared to 8 for low themes. The rate of suffixing per number of words was equal in all three groups, however. The poorer themes used fewer of certain kinds of suffixes. Themes rated low had practically no possessives, -ed, or past endings, and hardly any noun or adverb endings. Adjective endings, too, were severely limited in the low themes. High themes showed a marked rise in use of noun, adjective, and adverb endings, and especially the past verb ending. Of the suffixes counted, only -ing verbs, plurals, -ing endings, and participles did not seem to differentiate low from medium themes significantly.

THE ORAL SAMPLES

Forty of the 160 Ss whose written discourse was analyzed also provided samples of their oral discourse. The Ss were selected so that each picture of the set of 20 was represented

twice. Within this restriction, the particular Ss were randomly chosen. Each S was tested orally on two pictures. Initially, the same picture as that used previously for his written sample was shown, and he was asked to tell about it. The instructions were a slight variation of the previously used specific instructions. Then a second picture, also one of the 20 but which the S had not used to give a written sample, was presented and the S spoke as instructed about it. The oral sample was tape-recorded during a private session in a small conference room two weeks after the collection of the written samples.

The oral data were analyzed for 36 of the same variables tabulated from the written samples. These variables and the means of the oral groups are presented in Table 1. The oral data were analyzed for significant effects attributable to grade, sex, abstractness of picture content, and picture sequence.

There was only one significant difference between the first picture and the second picture in the set of 36 variables. The first picture produced slightly longer clauses than the second picture (6.94 words per clauses vs. 6.38; $p < .05$).

Unlike the written samples, differences due to grade level were minimal. Of the 36 variables, Sixth Graders used significantly more adverbial clauses ($p < .09$), more clauses per T-unit ($p < .06$) and more form-class words per function words ($p < .01$) than the Fourth Graders. The Sixth Graders, however, used fewer words per clause ($p < .01$), fewer qualifiers ($p < .001$) and fewer prepositional phrases ($p < .01$) than Fourth Graders. The means for these differences are shown in Table 1.

In the comparison between concrete and abstract picture, five of the 36 variables were statistically significant. Abstract pictures resulted in more adjective clauses ($p < .10$), more determiners ($p < .03$), and more determiners per noun ($p < .06$), but fewer types of sentence patterns ($p < .08$) and fewer infinitives ($p < .09$) than the concrete pictures.

The male Ss used fewer modals ($p < .07$) and fewer adjectives per noun ($p < .07$), but more determiners ($p < .06$), more determiners per noun ($p < .02$), more adjectives per noun ($p < .07$), and more prepositional phrases ($p < .08$) than the female Ss.

In the tests of interaction effects the Fourth Grade males produced very few subordinate clauses and multiclause T-units and accordingly had the lowest rate of clauses per T-unit ($p < .01$). The Sixth Grade females were highest on all three measures of clause usage.

ORAL AND WRITTEN SAMPLES COMPARED

The 36 variables common to both the oral and written samples were each analyzed by analysis of variance. Forty Ss were used and each S provided both an oral and a written sample of discourse in response to the same picture. That is, the first picture in the oral session was always used. The variables constitute the first 36 columns in Table 1. The significant differences were evident in the greater use of adjective clauses ($p < .01$), sentence patterns, ($p < .05$), prepositional phrases ($p < .03$), and in greater average numbers of words per T-unit ($p < .06$), and nouns per T-unit ($p < .03$), in the written than in the oral samples. Oral samples, however, showed more adverbs in the medial position before the verb ($p < .01$), and thereby more adverbs per T-unit ($p < .02$), and also more form-class words per function word ($p < .01$).

MULTIVARIANCE

The variables obtained from the written and oral samples were grouped where possible to provide a test of each factor in a multivariate sense. That is, sets of variables were considered as a group to determine whether differences between independent factors were generally reflected in the variables. Since some of the variables were linear combinations of other variables the entire set could not be tested in the same multivariate analysis. The general impression emerging from these multivariate analyses of sets of variables was that the writing measures were definitely distinguishing Grade Four from Grade Six ($p < .001$). The specific variables responsible for the measured differences were previously listed. The writing measures obtained from the girls were generally different from those of the boys ($p < .01$). The specificity of instructions did not produce a difference, nor did the dimension of concreteness-abstractness produce a general difference in the obtained measures, though the latter was near significance ($p < .10$) and probably due to slightly higher scores with concrete pictures. The multivariate test of color was also borderline but approached significance ($p < .10$) due to slightly higher scores with black and white pictures.

There were several interactions of note in the measures drawn from the written samples. In a multivariate sense the interaction of grade and sex was significant ($p < .05$). An analysis of this interaction revealed that on

several of the individual measures Fourth Grade boys were substantially poorer writers. They evidenced more words in fragments, fewer words per clause, fewer adjectives, and hence, fewer adjectives per noun than any other group.

A second interaction significant in a multivariate test was sex by color ($p < .07$). Females used more adverbs of manner, more other adverbs, more adverbial endings, and more coordinated T-units than males did when the picture was presented in color.

Abstractness and color also showed a significant interactive effect. The abstract color pictures showed the lowest scores of any group on various measures including verb types, qualifiers, other adverbs, initial adverbs, adverbial endings, and use of suffixes.

The multivariate test of the written and oral comparison showed that the 36 measures in general showed a difference ($p < .02$) between the two modes of discourse. The comparison of the high, medium, and low themes by a multivariate test showed that high rated themes possessed different characteristics than average themes ($p < .01$) and that low themes were very significantly different ($p < .001$) from the average theme.

In the oral samples, a multivariate test revealed that there were no general differences between the oral discourse in response to the first picture as compared to the second picture. The difference between grade level missed significance ($p < .11$), as did that between male and female discourse and between concrete and abstract pictures. None of the multivariate tests on interactions in the oral sample measures were significant.

IV
DISCUSSION

The type of research that inventories the syntax of children has been criticized (McCaig, 1970) for measuring language performance rather than language competence. The fact that a child does not use a noun clause within a sample of discourse does not mean that he could not or that he would not use one in the next sample. McCaig opts rather for research that will detail the availability of selected structures in a small group of Ss studied longitudinally. Hunt (1970) defends "poking around" in a corpus of discourse as a necessary task as preparation for the hypothesis-testing work that McCaig would have everyone do.

The distinction between competence and performance is useful, but whether to look at one or the other or both is a value judgment. The present authors have dealt mainly with actual performance and most of the data presented have been tabulations of such language performance. However, the use of a linguistic ability test has brought this study into the area of language competence as well. The results indicate that competence and performance (LAT and grammatical structures) are not very dramatically related. That is, the most competent users of the language as measured by the LAT are not distinguishable from less competent users by any marked differences in the use of any particular structure or sentence pattern. There are tendencies for the more competent users to write more using more varied sentence patterns and more subordination, but in general, competence and performance seem to have less than 10% common variance. Competence is, however, closely related to the misuse of the structures appearing in discourse. The higher the score on the LAT, the lower the error density, the correlation coefficient being -.60 for 36% common variance. See also Golub and Fredrick (1970b) for a description of errors.

The correlation between theme quality and the LAT score was +.73. This indicates that over half of the variance present in the quality of writing could be predicted from a knowledge of the S's score on the LAT. This correlation is high compared to usual levels of relationship between a test score and writing ability. The LAT appears to measure a basis of abilities important for written discourse. Considering the amount of error variance embedded in the grading of theme quality, the present obtained correlation is remarkably high. As a measure of theme quality, the LAT was somewhat more successful than IQ as a predictor, which correlated .62 with theme quality.

The structures in discourse that can be counted are only indirectly related to the competence (knowledge of the grammar) of the language user. Even the most inept student can come up with a variety of sentences and structures to communicate a thought. It may be a tedious and difficult process for him but the final product may be a good sentence and a satisfactory theme. The variety of structures, itself, will keep any one structure from being of critical importance in discriminating the writer's or speaker's ability. The variety may also keep tabulations of structures highly unreliable unless very large samples of discourse are obtained (Fredrick, 1970).

Valiant attempts at finding distinguishing features of good and poor discourse in the structures or syntax used have had only marginal success. Golub's (1967, 1969b) data showed that good and poor writers at the Eleventh Grade level do not differ much in the use of relative clauses, modals, aspects of the verb, the infinitive, various sentence patterns, single-base transforms and so on. There were some differences, however, that suggested the direction of the better writers. The better writers used the past tense of the verb and relied slightly less on the constant use of present tense. They used the passive voice about twice as frequently as the poorer writers, but used the expletive there less often.

They used the intransitive verb oftener and also showed some types of transitive verbs that poorer writers did not use. The major differences, however, were in the misuse of syntax and structure. The poorer writers had many more lexical and syntactic ambiguities and used more nonstandard grammatical forms.

The samples of good and poor oral discourse differed mainly on the use of negatives and content-specific vocabulary (Golub, 1967). The poorer speakers used many negatives and strayed from the ongoing content of their discourse.

The studies by Blount have been analyses of the differences between writing of Eighth and Twelfth Graders. His findings show that clause length increases from 7.8 to 9.0 words between the two grades, (Blount, Johnson, & Fredrick, 1969) while T-unit length increases from 12.3 to 15.0 words. Note that the Sixth Graders of the present study wrote clauses and T-units that averaged 7.8 and 11.8 words, respectively, and the Fourth Graders averaged 7.4 and 9.5 words. The Twelfth Graders produced the increased T-unit length by two processes. They used more subordinate clauses, especially noun and adverb, than the Eighth Graders and they wrote longer clauses.

When the high ability Ss were compared to the average ability Ss, Blount, Johnson, & Fredrick (1969) found that no significant differences were present. Previously Hunt (1965; and no date) had shown that consistent differences in the use of the subordinate adjective clause might be expected. The present study indicated a significant increase in the use of the adjective clause with age, but all types of subordinate clauses were used significantly less by the low quality theme writers.

The picture that emerges of the changes in writing between Fourth and Sixth Grade is comparable to that found by Harris (Braddock, Lloyd-Jones, & Schoer, 1963) in a study of 10- and 15-year olds in London. He established 11 criteria that discriminated the themes of each age-group. These criteria included the average length of correct simple sentences, and counts of different sentence patterns, non-simple sentences, subordinate clauses, total words, qualifying phrases, and adjectival phrases and clauses. The present study showed that, indeed, sentence length, subordinate clauses, and adjective modifiers along with other criteria such as use of modals and certain adverbs will change with increasing maturity (See also Harrell, 1957). Four other criteria used by Harris which involved counts of errors differentiated the Ss of the two grade levels in the present study also (Golub & Fredrick, 1970b). It appears reasonable to expect that the use of qualifiers and the quantity and variety of discourse will increase significantly somewhere after the Sixth Grade.

Potter (1967) has pointed out that at Tenth Grade the following structures seem reasonably effective in distinguishing good from poor writers: sentence length, T-unit length, coordination, subject-verb-object sentence patterns, passives, transitional expressions, prepositional phrases, verbal structures, and variety of clause-introducing conjunctions. He concluded that written discourse appears to be a kind of dialect of English and that writing consists of acquiring this dialect.

As shown by Hunt (1965), Blount, Johnson, and Fredrick (1969), and the present study, the T-unit is closely tied to the maturity of the writer. Hunt concluded that the T-unit length was the most reliable indicator of any of the synopsis scores he compared. Between Fourth and Sixth Grades in the present study, an increase of over two words per T-unit was noted. This is a significant increase. But the high and low quality themes did not show a significant difference in T-unit length (See also Biesbrock and Veal, 1969). The Blount study also showed no difference in T-unit length between high and average ability Ss, and male and female were approximately equal on this measure as well. Apparently the younger writers put less into each sentence and T-unit, and this seems to be true whether the writers are male or female or able or inept. The latter factors make for differences in the quantity of output while the complexity of output remains roughly the same from group to group.

Sex differences are usual when the verbal skills of elementary grade children are studied. May (1966) found that in oral language girls excel boys in the length of response, the number of different words used, the structural complexity of sentences, the length of sentences, and in the speed of development of language competence. Sharples (1968) found that at 10 years of age, girls wrote more clearly structured compositions that boys. But Zeman (1967) found that Second and Third Grade girls did not differ from boys in the use of sentence patterns.

In the present study, girls wrote more than boys in response to a stimulus. There were no differences though in quantity of spoken discourse. Quantity of output also seems to be the major distinction between good, average, and poor writers (Biesbrock & Veal, 1969), though poor writers have some additional problem using subordinate clauses, past tense, and adverbs. Striving for the production of discourse in quantity should be part of the curriculum. It appears that what teachers

grade is the ability to say a sufficient amount about a topic. A program that trades quantity for accuracy or maturity of expression is not going to teach the necessary language development adequately. For example, when Bateman and Zidonis (1966) tout the effects of studying generative grammar to increase the complexity and well-formedness of sentences, they do not give enough attention to the fact that their experimental group wrote 3,000 fewer words following the treatment while the control group increased its output more than 3,000 words during the same time-span. Miller and Ney (1968) show that simple oral exercises in the production of complex sentences do produce more and better writing by Fourth Graders.

The data from the present groups of Ss imply that sentence complexity is not a very direct way to judge the quality of discourse. There appears to be no easily obtainable measure of structures, be it T-unit, clause length, the verb string, modification, or affixing, that accounts for a significant proportion of the subjective impression of the overall quality of discourse as rated by teachers.

This conclusion, while negative, is nevertheless very important. The authors conclude that the criteria for good or bad writing do not lie within the specific sentence types, sentence constituents, and words that a S at this age uses. The basic language of discourse seems to be established sufficiently well in the Ss so that no single structure or combination of structures can be successfully and reliably used to distinguish good from poor writing.

Several reservations must be attached to the above statements, reservations which stem from the generalizability of the present research. The writing samples were obtained during a brief period for which no advance preparation was given. Whether procedures such as careful preparation of Ss, discussion of the task, unlimited time for writing, and revision would change the conclusions the authors do not know.

It is also true that the present writing situation was relatively controlled; that is, Ss had to respond to a stimuli not of their own choosing. It may be that this acted as a restriction upon the varieties of writing possible (c.f. Carroll, 1968). Removal of these restrictions may result in major differences between the level of sentence structures shown by good and poor writers.

Thirdly, while the analysis of structures was not a useful measure for discriminating students at the Fourth and Sixth Grade levels, it is very possible that at higher levels the good writers progress to very mature types of structures and vocabulary and leave the poor writers far behind.

A final point needs to be considered in regard to the Ss themselves. Although the group was heterogeneous, it did not represent all levels of class, race, and status. The Ss of the present experiment were from a rather limited range in terms of geographic area, social class, ethnic origin, and educational background. Most Ss were identified with the midwest, with lower-middle class values, with either white or Northern Negro history, and with "high school and onward to a job" as the achievement ethic. The lowest levels and the highest were not represented. Were these levels included, there might indeed be measureable differences in the kinds of structures and language shown in the discourse samples.

Sharples (1968) showed that different writing stimuli produce different kinds of writing. A picture of children at the seaside tended to result in more narration than a poem about winter, which stimulated descriptive writing, and a loud sound and touching a rusty key, both of which led to expository writing when presented to 10-year old Ss.

Labrecque (1968) has found the use of pictures effective in motivating writing. Children write their spontaneous reactions and impressions without preliminary discussion.

The experiment testing instructions and the color and abstractness of picture stimuli showed that one can marginally influence the complexity and quality of writing by the judicious selection of types of stimuli. But the extent to which this is possible is small compared to two other factors: one, the ability of the individual student including such factors as IQ, linguistic ability, and sex, and two, the specific content of the picture. Such picture qualities as unclutteredness, a tension or action of some kind that begs for explanation or speculation, and a topic that is within the life-scope of the student, appropriate to his age and thought level, seem important to look for in stimuli for writing, especially at this upper elementary level.

To attempt to alter the quantity or quality or complexity of writing by merely telling them to write in this way or that was not effective in the present experiment. The students' "writing set" is much too powerful to be swayed by a few sentences.

As a class of objects, black and white pictures seem to be slightly superior to color, but the content of individual pictures will easily outweigh this factor. If color is present, the student will often include it in his descriptions.

Depending on one's purposes, this description of color by the student can either be seen as using up time that could be used to develop other ideas to write about, or on the other hand, as a convenient handle for the uncertain student that will allow him some feeling of success.

The class of concrete pictures was slightly better as stimuli than the abstract, but it was comforting to learn that Fourth and Sixth Graders could do pretty well with either. Some of the abstract pictures were difficult to write about and the problem often seemed to be the result of content which was strange to the student. But many pictures of an abstract nature do lead to good descriptive efforts.

The comparison of the oral and written discourse showed at least one highly interesting fact. The Ss used more form-class words (nouns, verbs, adjectives, adverbs) per function word in speaking than in writing. If it can be assumed that function words serve to identify the relationships among form-class words and to specify them exactly, then speaking apparently requires fewer such identifications and specifications. Much of the meaning conveyed by tone and pause and gesture in speech must be conveyed by the use of additional function words when the same thought is presented in writing.

It appears, also, that written discourse is slightly more complex than oral discourse. The presence of longer T-units and a greater variety of T-unit patterns in the written discourse support this view. There seems, too, to be a shift in the kinds of modification used. Oral discourse relies more heavily on adverbs than written discourse while the latter emphasizes adjectives and prepositional phrases more.

DeVito (1967) showed that speech contains a greater number of finite verbs and fewer nouns of abstraction than writing. In a sense oral language is significantly less abstract than written language.

Superiority in oral and written work usually occur together in the elementary school child, as evidenced by Loban (1963) and Hughes (1953). Harrell (1957) used a movie as a stimulus for obtaining both an oral and a written sample from children aged 9, 11, 13, and 15. The length of discourse increased with age, and more subordinate clauses were used by the older Ss. A comparison of the oral and written samples showed more subordinate clauses, especially adverb and adjective clauses, in the written compositions but more noun clauses in the oral. Growth in writing was greater than in oral ability. At the elementary level, oral and written composition appear to be directly associated revealing similar growth patterns and development (Ruddell, 1966).

The 63 variables used in the present study were a large and somewhat uneven group. Some variables were much better for some purposes than others. Various of those listed in Table 1 could reasonably be eliminated or replaced. Brief comments about each will follow.

The total word count is an important and reliable measure. Separating the word count into form-class and function words adds little new information. Even the ratio of form-class and function words is uninteresting unless used in the comparison of oral and written discourse. The number of T-units appears to be informative in its own right as a measure of quantity of output and also in forming ratios such as words per T-unit. This ratio is an indicator of maturity in writing, as noted in the present study where the increased T-unit length in Sixth Grade over Fourth Grade was highly significant. The number of clauses again measures quantity, and when divided by the number of T-units it shows the use of subordination in the writing which is another sign of maturity in discourse. Sixth Graders of the present study used significantly more clauses per T-unit in both oral and written discourse than did the Fourth Graders. The number of subordinate clauses really adds no new information since clauses per T-unit presents the same basic data. Words per clause is a reliable indicator but should probably be replaced by two other ratios that would more accurately reflect important trends. Since clauses are of two types, main and subordinate, the two ratios should be computed using these separate types. Words per main clause and words per subordinate clause would each show important trends in writing, as a student may be progressing on one of these but not on the other. Classifying the various types of subordinate clauses is marginally useful since it has been shown that the rate at which the various types of subordinate clauses appear is very unreliable from sample to sample (Fredrick, 1970). About the only firm conclusion possible from the frequency counts of the types of subordinate clauses is that the low quality themes display very few kinds of subordination. The count of multi-clause T-units gives little information not already contained in the measure of clauses per T-unit. The measure of the types of T-unit patterns appearing in the discourse has an uncertain status. It is largely determined by the quantity of writing and probably also by the particular writing task. The variety of patterns may be a useful measure in studies in which different

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kinds of discourse assignments are compared, as for example, when comparing narrative and exposition. The count of single-base transforms was not useful but should perhaps be included whenever the previous variable, T-unit patterns, is of interest. The counts of modals, be and have forms, infinitives, and verb types could profitably be replaced by a more comprehensive measure of the proportion of expanded verb phrases. In this new measure the various ways of expanding a verb into a phrase would be weighted and tabulated to arrive at an average measure of expansion. The counts of nouns and determiners simply reinforced the data gained from the total word count. The count of adjectives did show some meaningful differences between good and poor quality themes and between written and oral discourse. Prepositional phrases also showed similar trends but it is unclear why the large difference between Grades 4 and 6 on this variable occurred in the oral discourse. Nouns per T-unit gave little information of significance, and as a variable it is probably too much influenced by the appearance of lists within a theme. Determiners per noun gave an interesting and consistent result with males using more determiners than females in both oral and written discourse. Why this difference should occur is unclear, though it may reflect the relative lack of other modification of nouns in the typical male discourse. The rate of adjective use was really too infrequent to require the variable adjectives per noun. No meaningful conclusions were revealed by this variable. The use of qualifiers did produce some interesting results. The Fourth Graders used them at a greater rate than Sixth Graders, which probably stems from the use of many indefinite pronouns in oral discourse. In written discourse, the females as a group also made much use of the indefinite pronoun. Possessives were used extensively by the better writers, but their greater use by Fourth Graders was unexpected. The rate of use of qualifiers and possessives is perhaps too low to have provided very reliable indicators of their general use. The data on adverbs and the position in which they were used provided some valuable insights. There appears to be a general trend as writing matures to position adverbs nearer the verb rather than initially. Females use adverbs more liberally than do males. Certain kinds of stimuli, concrete black and white pictures, tend to result in writing which includes many adverbs. A relatively low frequency of adverb use is an important determiner of low quality writing. Variables 37-48, which involve suffixes, produced one major result. High quality writing displays various suffixes to a much greater extent than low quality writing. Adjective, adverb, noun, possessive, and past endings were used twice as frequently within a given length of discourse by high ability writers.

The present study stands as a major attempt to analyze oral and written discourse. Many variables were extracted from a controlled sample of the writing and speech of Fourth and Sixth Graders. The quantity and complexity of the language were compared to the rated quality of discourse and to the linguistic ability of the Ss. Many differences were found among the groups according to grade, sex, stimuli, and quality and mode of discourse. The basic data exist in Table 1. For a fuller understanding of the results, the reader is requested to study Table 1 at length. There he may find results that were not emphasized, but which offer him evidence about his own hypotheses regarding language.

APPENDICES

APPENDIX A: PICTURE DESCRIPTIONS

Picture No. 1; color photo: Two small girls about 3 years old are at a red drinking pump. One girl is pumping water while the other drinks. The background and setting are indefinite.

Picture No. 2; black and white photo: Three girls of different ages and height are standing in the foreground behind a wire fence. Their clothing and the wooden buildings in the field behind them reveal their impoverished existence.

Picture No. 3; black and white photo: A soldier in uniform is squatting to comfort a small crying boy. The soldier holds his rifle in one hand, the boy in the other. This is the entire photograph except for the hand of another man in the immediate background.

Picture No. 4; color photo: An outdoor market, photographed from above, offers an array of brightly colored fruit, vegetables, vendors, and customers. The market is set up before a beige stucco building with grillework doors and semi-balconies. In one window someone is watering the plants on the ledge.

Picture No. 5; black and white photo: A Negro boy and a smaller white boy are walking down the sidewalk of a business district. The black boy has his arm around the shoulders of the white boy. In the background one man is surveying the window of a hat store; an older man with a cane is sitting on the doorstep next to him.

Picture No. 6; black and white photo: A young white woman, kneeling on the grass, is tying a paper plate flower hat on the head of a Negro child.

Picture No. 7; black and white photo: A dog, chained to a wooden chair, sits in front of a dresser which holds many photographs and a newspaper. Hanging on the wall above the dresser are a mirror, two more photographs, and scissors.

Picture No. 8; color photo: A boat containing four crew men is photographed at the moment it capsizes. The oars are either detached or out of control. One man is tossed overboard. The other three are in violent motion, trying to retain their hold on the boat.

Picture No. 9; color photo: A small girl in a long pink dress, her head bowed, stands in the grass among a variety of flowers. In the hazy background stands a large white, two-story mansion.

Picture No. 10; color painting: This is a color photo of Picasso's 1949 painting entitled Claude. A small boy is standing next to a toy horse.

Picture No. 11; color painting: This is a color photo of Picasso's 1957 painting entitled Children and Dog. On a bright yellow background are three human figures in green, blue, and red. At the bottom is a white animal.

Picture No. 12; black and white painting: This is a photo of Chagall's Winter Scene, in which two human figures, one holding an artist's palette, dominate. Rows of houses are in the background along with horse and sleigh, moon, and lamppost.

Picture No. 13; black and white painting: This is Picasso's painting of The Meal, showing a mother in the center serving her two children who are seated at the table.

Picture No. 14; color painting: In Chagall's The Cat a man with two faces sits in the foreground before a window. On the edge is a yellow cat with a human face. Through the window one can see the Eiffel Tower, buildings, people, and an upside-down train.

Picture No. 15; color photo: In the middle of a gray iron ground is an orange glowing furnace opening. Four metal spikes are around the opening; two are connected by a bundle of wire.

Picture No. 16; black and white photo: On a plain background an intricate snail shell forms a pattern of dark and light curves.

Picture No. 17; color photo: This is an aerial photograph of a pavilion roof at Montreal's Expo '67. Shadows and light dramatize the overlapping wedges which radiate from a central tower, forming the roof. To the right are two red conical roofs.

Picture No. 18; color painting: In Chagall's Russian Village the larger forms are an animal and a man. Smaller figures include field workers, a row of houses, and a woman milking a cow.

Picture No. 19; black and white photo: This is a view from above of the swirling patterns made by water on sand and rocks. Near the bottom is a stray piece of wood.

Picture No. 20; black and white painting: In this modern painting by Roy Lichtenstein circular shapes and curved lines contrast with a pointed shape entering the picture like a bolt of lightning.

APPENDIX B: DIRECTIONS

SPECIFIC

Writing About a Picture

You are to write something about this picture. Look carefully at the picture. Think about what it is showing. If there are people in your picture, look at what they are doing, how they are dressed, what they seem to be feeling. If there are no people, look at the shapes and figures and think what they might remind you of. Remember that small details might be very interesting. Does the picture remind you of anything in your own life? The picture may make you feel sad or happy or nothing at all. It may show objects which you could touch or smell. You may see or imagine shapes or colors in the picture. Think of these things and then write whatever you would like to say about the picture.

You will have enough time to write all of your ideas. If you have any questions, just raise your hand.

GENERAL

Writing About a Picture

You are to write a theme or story about this picture. Look at the picture carefully and then think about what it is showing or what is happening. Think about what feelings you get from the picture. Then write down your ideas and thoughts. Write anything you wish to write as long as it expresses what you are really thinking. Write as much as you can about what you see in the picture, what ideas and thoughts the picture gives you, how you feel about the picture.

You will have enough time to write all of your ideas. If you have any questions, just raise your hand.

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APPENDIX C:

Abilities Measured by the *LAT*

I. To evaluate syntax holding the meaning constant.

II. To distinguish probable English grapheme clusters from improbable English grapheme clusters.

III. To determine pronoun referents.

IV. To recognize a word in the S's lexicon, given a clue from more or less predictable phoneme-grapheme correspondences.

V. To transform a given English sentence to a synonymous sentence by changing word order and not introducing new content words.

VI. To recognize morphemes as roots, prefixes, and suffixes.

VII. To recognize form-class and function-class slots (positions) in sentences.

VIII. To use the deletion transformation.

IX. To recognize the phoneme equivalents of various English graphemes and grapheme clusters.

X. To recognize the structures of various questions in order to produce the appropriate response structures.

XI. To embed one base sentence in another base sentence to produce a well-formed transform sentence.

XII. (1-8) To distinguish well-formed English sentences.

(9-12) To recognize logical meaning relationships between elements of a sentence.

XIII. To properly expand the transformational auxiliary of the verb phrase.

XIV. To use unpredictable and rare orthographic patterns in spelling English words.

XV. (1-6) To determine vowel and consonant letter frequency in English.
(7-8) To determine function-word frequency in English sentences.

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